

Islamic Republic of Iran
Organization for investment economic and technical assistance of Iran

"Summary of technical-economical prefeasible study"

The name:

Production of Activated Carbon and Printer Ink

Sector: Industry **Subsector:** Petrochemical Industries **ISIC Code:** 24291510

The owner of:

General Directorate of Economic Affairs and Finance of Kermanshah Province

Counselor plan:

Razi University of Kermanshah

The ADDRESS:

Gilan-Gharb, Kermanshah Province

Date of P.F.S:

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Manager of Iran Investment Opportunities
SHAHRIG Engineering Company

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1- Abstract:

PROJECT PROFILE - SUMMARY SHEET

Project Introduction	
1- Project title: Production of activated carbon and inkjet printers	
2- Sector: Industry	Sub Sector: Petrochemical industries
3- Products / Services: Activated Carbon	
4- location (address)	
Free Zone <input type="checkbox"/>	Economic Special Zone <input type="checkbox"/>
Industrial Estate <input checked="" type="checkbox"/>	Main Land <input type="checkbox"/>
5- Project description: <p>For this industrial unit with an annual capacity of 100,000 tons of activated carbon and derivatives, the required land is estimated to be 40,000 square meters. Considering the purchase price of 20 million Rials per square meter in Gilan Gharb Industrial Town, the total cost of land acquisition amounts to 800 billion Rials. The site preparation includes leveling 40,000 square meters, constructing 10,000 square meters of walls and fencing, installing one metal entrance gate, and creating 6000 square meters of green space and lighting, with an estimated cost of 871 billion Rials.</p> <p>Construction includes the production hall (12,000 square meters), raw material and parts warehouse (3000 square meters), product warehouse (2000 square meters), design unit (400 square meters), laboratory and quality control unit (500 square meters), administrative building (1000 square meters), dining hall and canteen (500 square meters), security and caretaker rooms (100 square meters), power and generator room (100 square meters), and restrooms (200 square meters), totaling 19,800 square meters with a cost of 3645 billion Rials. Additionally, the infrastructure includes electricity (250 kW connection), water (1-inch connection), gas, diesel (5,000-liter tank), and gasoline (5,000-liter tank) with a cost of 5.2 billion Rials</p>	

Project Status	
6- Local / internal raw material access: 80%	
7- Sale : - Anticipated local market : 30% - Anticipated export market : 70%	
8 – Project total time (from start of activities to start of commercial operation in years) : 15 months	
Schedule	Start of activities: Month 1 to 4 (4 months) Start of works at site : Month 5 to 10 (6 months) End of Works: Month 11 to 14 (4 months) Start of commercial operation: Month 15 (1 month)

9- Project status :

- Feasibility study available? Yes No
- Required land provided? Yes No
- Legal permissions (establishment license, foreign currency quota, environment, etc) taken? Yes No
- Partnership agreement concluding with local /foreign investor? Yes No
- Financing agreement concluding? Yes No
- Agreement with local /foreign contractor(s) concluding? Yes No
- Infrastructural utilities (electricity water supply, telecommunication, fuel, road, etc) procured? Yes No
- List of know- how, machinery, equipment, as well as seller /builder companies defined? Yes No
- Purchases agreement machinery, equipment and know-how concluded? Yes No

Financial Table

10- Financial structure :

Descriptions	Local Currency Required			Foreign Currency Required Million Euro	Total Million Euro
	Million Rials	Rate	Equivalent in Million Euro		
Fix Capital	9637970	500000 Rial	19.28	30.56	49.84
Current Capital	85084908	500000 Rial	170.17	-	170.17
Total Investment	94722878	500000 Rial	189.45	30.56	220.01

- Value of foreign equipment / machinery **30.56** Million Euro
- Value of local equipment / machinery **0.16** Million Euro
- Value of foreign technical know-how **-** Million Euro
- Value of local technical know-how **-** Million Euro
- Net present value (NPV) **386** Million Euro
- Internal Rate of Return (IRR) **70.42** %
- Capital Rate of Return: **64** %
- Payback Period **2 year and 8 months**

General Information

11 - Project type: Establishment ☒ Expansion and completion ☐

12- Company Profile

- Name (Legal / Natural persons): **Industry, Mine and Trade organization**
- Company's current activities: **Government services**
- Address: **Next to the Blood transfusion organization, Shahid Beheshti Blvd., Kermanshah**
- Tel: **08338239160** Fax: **08338239157**
- E-mail: Web Site: **www.ksh.mimt.gov.ir**
- Company's legal structure:
- Government ☒ Non-Governmental ☐ Public non-governmental ☐

2. Project's location:

2-1- Province:



Kermanshah Province is a mountainous region in western Iran, covering an area of 25,900 square kilometers and sharing a 370-kilometer border with Iraq. It is bordered to the north by Kurdistan Province, to the south by Lorestan and Ilam Provinces, to the east by Hamadan Province, and to the west by Iraq. The provincial capital is Kermanshah city, and the province currently consists of 14 counties, 21 cities, 31 districts, 86 rural districts, and 2,793 inhabited villages, with a population of about 2 million people. Kermanshah is strategically positioned on

the main east-west and northwest-south routes of the country, making it a key transit corridor for goods and services to Iraq and for pilgrims traveling to holy sites in Iraq, with close proximity to major economic centers in Iran.

Due to its geographic location within the Zagros mountain range, Kermanshah experiences a variety of climates, earning it the nickname "the four-season province."

Kermanshah's extensive border with Iraq provides convenient access to land and air routes, and it boasts numerous technical and vocational training centers. It has a road network of 2,796 kilometers, is located along the Silk Road, and serves as a major healthcare and medical education hub for western Iran. The province also benefits from connections to the western railway line from Arak to Kermanshah and is home to key infrastructures, such as the Kermanshah Refinery, Bistoon Power Plant, oil and gas reserves, and the Shahid Ashrafi Esfahani International Airport (the largest airport in western Iran). Additionally, it offers opportunities for exporting engineering and technical services to Iraq, particularly in power, dam construction, energy, and infrastructure sectors.

Kermanshah has a skilled and unemployed workforce, a favorable social and economic environment for attracting domestic and foreign investment, and promotes economic and trade activities with Iraq and the Kurdistan Region. It lies on a key transit axis between northwest and southern regions and supports religious tourism to Karbala, with millions of pilgrims passing through annually. The province also supports infrastructure needs, such as water, electricity, and gas, in its 23 industrial parks and zones.

The province hosts official customs facilities at Khosravi and Parviz Khan in Qasr-e Shirin and various trade hubs at Shushmi, Nosood, Sheikh Saleh in Thalab Babajani, and Sumar. It has significant ecotourism potential due to its diverse climate, forests, and flora and fauna. Other notable features include the Qasr-e Shirin Free Trade-Industrial Zone, the Eslamabad-e Gharb Special Economic Zone, the western railway connecting to Iraq and Syria, and eight operational dams with a total capacity of 832 million cubic meters. These attributes position Kermanshah as a province with vast economic, industrial, and tourism potential.

Kermanshah Province possesses significant industrial and mineral capabilities, including major industries such as the Bistoon Petrochemical Plant, Kermanshah Petrochemical Plant, Jahan Folad Gharb Steel Mill, Saman Cement, West Cement, the propylene production project, and the Kermanshah Refinery. The region is also rich in natural resources, with substantial reserves of oil and natural gas, various building material quarries (such as decorative stone, gypsum, rubble stone, and lime), and both metallic and non-metallic mineral deposits, including iron ore, silica, and feldspar. The province has a plentiful labor force, skilled designers, and experienced professionals in hand-woven carpets. Additionally, Kermanshah is distinguished by its reserves of natural bitumen (gilsonite and bitumen) and its potential for processing and exporting these resources. The unique mineral reserves of non-metallic minerals and upstream industries set Kermanshah apart from other provinces in western Iran.

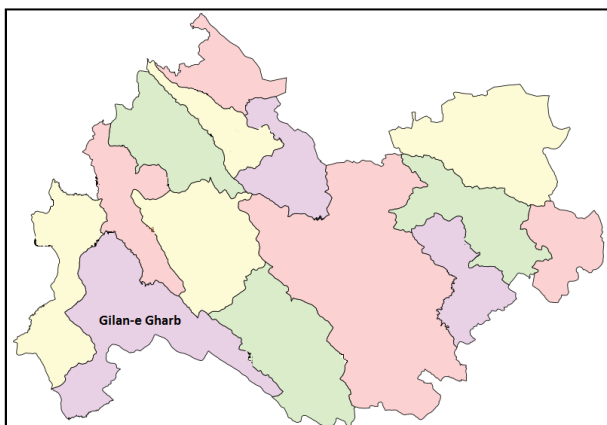
The province's agricultural and livestock sector is also highly developed, with 22 storage dams and 9 billion cubic meters of water resources, 946,871 hectares of farmland (227,500 hectares of which are irrigated), 208 medicinal plant species, an average annual rainfall of 537 mm, 9,258,711 hectares of rangeland, and 527,404 hectares of forest. It supports the production of 20,281 tons of canola, 477,910 tons of wheat, 326,000 tons of barley, 208 tons of oilseed sunflowers, and 14,903 tons of sunflower seeds for nuts. There are also 1,038 industrial and semi-industrial units in livestock, dairy, and poultry farming, with a livestock population of 2,971,153 sheep and goats and 300,519 cattle. These produce 120,405 tons of red meat, 36,450 tons of poultry, 83,955 tons of chicken, fish, and other products annually, along with 182 agricultural processing units.

Kermanshah boasts a rich historical and cultural heritage, ranking third in Iran for historical sites after Shiraz and Susa, with landmarks like Bisotun and Taq Bostan located within the major city of Kermanshah. The province has six tourist zones and 14 tourism hubs, featuring over 100 tourist sites, including Taq Bostan, the traditional bazaar, Jameh Mosque, Sarab Nilofar, and historical sites like the Ganj Dareh mound, Darius Inscription, Shah Abbasi Caravanserai, Anahita Temple, and scenic areas such as Sarab Darband in Sahneh, Rijab River, Yazdegerd Castle, Abu Dujana Tomb, Quri Qaleh Cave, Sarab Ravansar, Rijab Waterfall, and Hajij and Shamsir villages.

Kermanshah has international trade infrastructure, such as the Khosravi and Parviz Khan borders, and offers investment opportunities in health tourism. The province's numerous attractions include the globally registered Bisotun complex, Taq Bostan complex, Anahita Temple, Taq-e Gara, protected areas ideal for ecotourism focused on native flora and fauna, and architectural marvels like the Moaven al-Molk Tekyeh and Biglar Beigi Tekyeh. The rich cultural and ethnic diversity offers anthropological tourism potential, featuring local traditions, attire, lifestyles, dialects, customs, religion, and music, enabling the creation of cultural and heritage tours. Natural attractions support sports tourism, including paragliding, climbing at Simreh cliffs, dam reservoir water sports, caving, and mountaineering, as well as notable tourist sites like Sarab Karand and the Bisotun-Taq Bostan tourism corridor. Key villages, like Shamsir and Fash, serve as ideal rural tourism destinations, positioning Kermanshah as a prime region for tourism development.

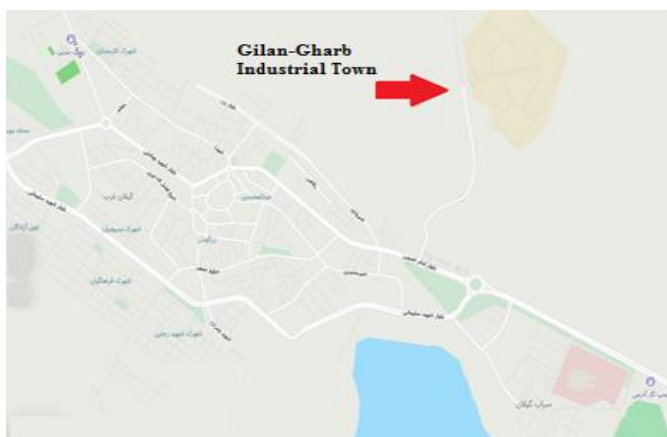
2-2- the County: Gilan-Gharb

Gilan-Gharb is one of the counties in Kermanshah Province, located in the western part of the province, with a population of approximately 70,000 people. The county borders Sarpol-e Zahab and Dalahu to the north, Islamabad-e Gharb to the east, Qasr-e Shirin to the west, and Ilam Province to the south. The inhabitants of Gilan-Gharb are all Kurds from the Kelhor tribe, which is the second-largest tribe in Iran and one of the largest in Kermanshah. The county consists of two districts—Gowar and Central—two cities, Gilan-Gharb and Sarmast, six rural districts, and 202 villages, of which 194 are currently inhabited.



Gilan-Gharb has a rich history, with ancient mounds and natural resorts, and it has been the site of various events throughout both ancient and modern history. The most important industrial units in Gilan-Gharb include production units for grading sand and gravel, bitumen powder and some derivatives of natural bitumen, bricks, bandages, medical gases, heavy vehicle cushion production, and electrical protectors. The mines in Kermanshah Province are categorized into five mining regions. Accordingly, the Gilan-Gharb region has identified natural bitumen and gypsum mines.

2-3- the project:



The proposed location for the implementation of the Gilan-Gharb Industrial Town project is suggested to be at the global geographic coordinates UTM(34.1462, 45.9343), which offers suitable access to infrastructure facilities such as water, electricity, gas, and communication routes, and complies with environmental guidelines and recommendations.

2-4-access to the infrastructures:

No.	Needed infrastructures	distance to the project	The supply infrastructures
1	water	Less than 1 km	Gilan-Gharb Industrial Town
2	electricity	Less than 1 km	Gilan-Gharb Industrial Town
3	gas	Less than 1 km	Gilan-Gharb Industrial Town
4	Telecommunications	Less than 1 km	Gilan-Gharb Industrial Town
5	High way	Less than 10 km	Ministry of Roads and Urban Development - Kermanshah
6	Sub way	Less than 1 km	Ministry of Roads and Urban Development - Kermanshah
7	airport	150 km	Shahid Ashrafi Airport, Kermanshah
8	port	1609 km	Ports and Maritime Organization of Iran - Bandar Abbas
9	Rail way	150 km	Iranian Railways - Arak (Kermanshah)

3- Technical Specifications of plan:

3-1 –product: Activated Carbon

Activated carbon, as a strong adsorbent, plays a significant role in the removal of pollutants from various environments due to its highly porous and microscopic structure. The internal surface area of this material increases significantly due to the complex processes it undergoes during production. These processes include thermal or chemical activation, which creates microstructures and pores of various sizes with high adsorption capacity (Liu, 2022). Generally, the size and shape of the pores in activated carbon can be distributed on a micro, meso, and macro scale, with each type having the ability to adsorb different molecules based on its specific characteristics (Wang et al., 2023).



Activated carbon is produced from various materials such as coal, wood, and biological waste like coconut shells. The production process involves two main stages: carbonization and activation. In the carbonization stage, the raw material is heated at high temperatures (600-900°C) in an inert atmosphere (such as nitrogen or argon) to vaporize volatile components and leave behind the remaining material, primarily pure carbon. Then, in the activation stage, this pure carbon undergoes either chemical or physical activation. In physical activation, the carbon material is heated at

higher temperatures (800-1100°C) and exposed to oxidizing gases like steam or carbon dioxide, which develop the porous structure. In chemical activation, chemicals like phosphoric acid or potassium hydroxide are used to create pores at lower temperatures (400-600°C) (Zhao, 2021).

Activated carbon is divided into two main types: powdered activated carbon (PAC) and granular activated carbon (GAC). Each type has unique properties due to its particle size and pore structure, making them suitable for different applications (Zhang et al., 2020). Powdered activated carbon (PAC) consists of fine particles smaller than 0.1 mm and, due to its higher surface area, has a greater ability to adsorb pollutants compared to other types. This type is especially used in wastewater treatment, organic material removal, and toxin elimination (Li et al., 2019).

In contrast, granular activated carbon (GAC) has larger particles (ranging from 0.5 to 4 mm), making it more suitable for applications that require high flow rates of liquids or gases. For example, GAC is used in industrial air filtration systems and municipal water purification filters. In addition to these two types, there is also compressed activated carbon (EAC), produced in small cylinders with a diameter of approximately 0.8 mm. Due to its high mechanical strength, it is used in specific applications such as air filters and odor removers (Zhang et al., 2020).

One of the most important applications of activated carbon in industry is water purification. In this field, activated carbon acts as a strong adsorbent to remove organic materials, chlorine, and other toxic compounds such as phenols and hydrocarbons (Li et al., 2019). GAC is commonly used in drinking and industrial water purification, especially when high precision is needed to remove specific pollutants. Additionally, in the pharmaceutical industry, activated carbon is used to purify pharmaceutical solutions and remove impurities. It is also used to eliminate toxic substances and even inactive drugs from the human body (Zhao et al., 2021).

In the oil and gas industry, activated carbon serves as an adsorbent for solvent recovery and harmful gas separation. These processes, especially in refineries and petrochemical industries, are of great importance due to the ability of activated carbon to adsorb organic compounds and toxic gases (Wang et al., 2023).

Recently, one of the innovative and interesting applications of activated carbon is its use in the production of conductive inks for 3D and traditional printers. Activated carbon-based inks, due to their porous structure and high conductivity, can be used in printing electronic circuits, sensors, and even anti-counterfeit banknotes (Liu et al., 2022).

In this process, activated carbon is prepared in the form of nanoparticles or microparticles and suspended in a carrier liquid, such as water or organic solvents, to be used as ink in printers. These inks, due to their conductive properties and ability to adsorb harmful substances, have gained importance in various fields such as electronic technologies and biocompatibility (Zhao et al., 2021).

With the development of new technologies, the applications of activated carbon have expanded into areas such as clean energy and nanotechnology. The use of this material in bio-batteries, supercapacitors, and even fuel cells demonstrates its high potential in advanced energy industries. Furthermore, research is underway to optimize the production processes of activated carbon and improve its properties to increase efficiency and reduce costs. Specifically, using biological waste and inexpensive materials for activated carbon production could reduce production costs and increase environmental sustainability in industries (Zhang et al., 2020).

However, the focus of this project is on activated carbon processed from natural bituminous coal, which is currently estimated to have an annual extraction rate of about 100,000 tons from the mines in Kermanshah Province, with over 70% of this amount located in the Gilan-Gharb and Somar regions (Donyaye Madan, 2024).

3-2-project's requirements:

3-2-1-Space and infrastructure required:

A. Land:

The minimum land required is estimated at 40,000 square meters. Given the purchase price of 20 million rials per square meter in Gilan-Gharb, the total cost of land acquisition is estimated at 800 billion rials, which is equivalent to 1.6 million Euros (with the exchange rate of 1 Euro = 500,000 rials):

Land Area (m²)	Unit Price (Billion Rials)	Total Cost (Billion Rials)	Total Cost (Thousand Euros)
40,000	0.02	800	1,600

B. Site Development:

The site development cost includes leveling, walling, fencing, entrance gate, green space, and other elements. The detailed breakdown of these costs is provided in the table below:

No.	Description	Area (m²)	Unit Price (Billion Rials)	Total Cost (Billion Rials)	Total Cost (Thousand Euros)
1	Leveling, excavation, and filling	40,000	0.005	200	400
2	Walling, fencing, and landscaping	10,000	0.04	400	800
3	Street paving, sidewalks, parking, and asphalt	8,000	0.03	240	480
4	Green space and lighting	6,000	0.005	30	60
5	Metal entrance gate	-	1	1	2
Total				871	1,742

C. Construction Costs:

Considering the size of machinery and equipment, the minimum working space is suggested as follows:

No.	Description	Floor Area (m ²)	Unit Price (Billion Rials)	Total Cost (Billion Rials)	Total Cost (Thousand Euros)
1	Production Hall	12,000	0.20	2,400	4,800
2	Raw Material and Parts Warehouse	3,000	0.15	450	900
3	Finished Goods Warehouse	2,000	0.15	300	600
4	Design Unit	400	0.15	60	120
5	Laboratory and Quality Control	500	0.15	75	150
6	Administrative Building	1,000	0.20	200	400
7	Canteen and Self-service	500	0.20	100	200
8	Security and Caretaker Building	100	0.15	15	30
9	Electrical Room and Generator	100	0.15	15	30
10	Restroom	200	0.15	30	60
Total		19,800		3,645	7,290

D. Utilities and Infrastructure Costs: The maximum energy consumption for this unit is based on 270 working days and a single 8-hour shift, as proposed:

No.	Facility Title	Technical Specifications	Daily Consumption/Hour	Hour/Shift	Working Days	Overlap Factor	Maximum Energy Consumption in the Unit	Total Cost (Billion Rials)	Total Cost (Thousand Euros)
1	Electricity	250 kW	250	8 hours	270	0.8	43,200 kWh	5	10
2	Water	1-inch	16.5	1 shift	270	-	4,455 m ³	0.1	0.2
3	Gas	-	225	1 shift	270	-	60,750 m ³	0.04	0.08
4	Diesel	5,000-Lit tank	60	1 shift	270	-	16,200 Lit	0.03	0.06
5	Gasoline	5,000-Lit tank	60	1 shift	270	-	16,200 Lit	0.03	0.06
Total								5.2	10.4

3-2-2-Equipment and machinery:

Required Equipment and Machinery for an Industrial Unit with an Annual Capacity of 100,000 Tons, Estimated at 15,320 Billion Rials (Equivalent to 30,640 Thousand Euros):

No.	Equipment / Machinery	Specifications	Quantity	Unit Price (Billion Rials)	Total Price (Billion Rials)	Total Price (Thousand Euros)
1	Activated Carbon Reactors	2m x 4m, stainless steel	10	60	600	1,200
2	Rotary Kilns	2m x 10m, stainless steel	6	80	480	960
3	Crushers	500 kg/h, stainless steel	6	320	1,920	3,840
4	Ball Mills	1m x 2m, stainless steel	6	480	2,880	5,760
5	Conveyors	10m x 1m, stainless steel	6	120	720	1,440
6	Screens	2m x 3m, stainless steel	6	200	1,200	2,400
7	Dust Collectors	10,000 m³/h, stainless steel	6	400	2,400	4,800
8	Fans	10,000 m³/h, stainless steel	6	200	1,200	2,400
9	Control Systems	PLC, touch screen, sensors	1	200	200	400
10	Laboratory Equipment	Various (e.g., ovens, analyzers)	1	100	100	200
11	Packaging Machines	500 kg/h, stainless steel	4	320	1,280	2,560
12	Forklifts	2-ton, electric	3	50	150	300
13	Air Compressors	10 bar, 10 m³/min	3	80	240	480
14	Pumps	Various (e.g., centrifugal, diaphragm)	6	40	240	480
15	Valves	Various (e.g., ball, gate)	50	20	1,000	2,000
16	Pipes and Fittings	Various (e.g., stainless steel, PVC)	-	-	200	400
17	Electrical Distribution	Switchgear, cables, etc.	-	-	80	160
18	Safety & Environmental Equipment	Fire extinguisher, safety showers, etc.	-	-	20	40
19	Office Equipment	Table, chair, etc.	-	-	20	40
20	Emergency Generator	770 kW/h	1	-	40	80
21	Heating and Cooling	Cooler, heater, etc.	-	-	40	80
22	Central Phone and Communication	PBX system, IP phones, switches, routers, racks, Ethernet passive network equipment, conference software, call recording systems, computers, implementation services, maintenance, CRM software, etc.	-	-	80	160
23	Overhead Crane	Capacity: 10 tons, span: 20 meters	1	200	200	400
24	Light Trucks	Force 6-ton	1	20	20	40
25	Service Vehicles	Dena Plus	1	10	10	20
Total					15,320	30,640

3-2-3- Raw materials and intermediate components:

For the production of activated carbon, the raw materials and intermediary components used in the production process are as follows:

❖ **Main Raw Materials:**

- **Bituminous Coal:** The primary source is in Gilan Gharb, with about 70,000 tons extracted annually out of a 100,000-ton extraction capacity in Kermanshah Province. Additionally, areas like Somar and Ivan Gharb in Ilam Province, due to their proximity, can also serve as alternative suppliers for this raw material.

❖ **Intermediate Chemicals (for Chemical Activation):**

- **Phosphoric Acid (H₃PO₄):** A chemical used for the chemical activation of carbon.
- **Zinc Chloride (ZnCl₂):** Assists in chemical activation by lowering the activation temperature and enhancing the quality of the activated carbon.
- **Potassium Hydroxide (KOH):** Used in chemical activation processes to create highly porous activated carbon.

❖ **Auxiliary and Intermediary Materials:**

- **Steam:** Utilized in the physical activation process to open up pores and create porosity in the carbon.
- **Nitrogen Gas:** Used to create an anaerobic environment during production and prevent oxidation of the carbon.
- **Oxygen:** May be used in the activation process or to improve combustion conditions in the production kilns.

❖ **Intermediary and Consumable Components:**

- **Refractory Bricks:** Lining for carbonization and activation kilns to withstand high temperatures.
- **Seals and Gaskets:** Used to prevent leakage in process joints and pipelines.
- **Industrial Filters:** For purifying air and exhaust gases from the kilns.
- **Insulation Materials:** Insulate kilns and maintain high internal temperatures.
- **Catalysts:** Used in certain chemical processes to accelerate reactions.

❖ **Water and Fuels:**

- **Water:** For cooling, steam production, and in some cases, for raw material washing processes.
- **Natural Gas:** Supplies the energy needed in carbonization and activation kilns.

Material/Component	Consumption Rate per Ton	Approximate Unit Price (Million Rials)
Main Raw Material		
Bituminous Coal	2.5-3 tons	100 million Rials/ton
Intermediate Chemicals		
Phosphoric Acid (H ₃ PO ₄)	0.5-1 ton	110 million Rials/ton
Zinc Chloride (ZnCl ₂)	0.5-1 ton	100 million Rials/ton
Potassium Hydroxide (KOH)	0.3-0.5 ton	150 million Rials/ton
Auxiliary Materials		
Steam	1.5-2 tons	2 million Rials/ton
Nitrogen Gas	50-100 kg	5 million Rials/ton
Oxygen	50-100 kg	2 million Rials/ton
Consumable Components		
Refractory Bricks	Annual Consumption	150 million Rials
Seals and Gaskets	Annual Consumption	10 million Rials
Industrial Filters	Annual Consumption	25 million Rials
Insulation Materials	Annual Consumption	25 million Rials
Catalysts	Annual Consumption	150 million Rials

3-2-4-management and human resources:

The table below estimates the number of personnel needed to set up a production line with a nominal capacity of 100,000 tons per year. The operation of the production unit does not face any challenges in terms of workforce availability and will create significant employment opportunities in the region.

No.	Position	Activity Type	Skill Level	Number (People)	Basic salary	Annual Salary
					(Million Rials)	
1	CEO	Non-production	expert	1	150	1800
2	Production Manager	Non-production	expert	1	150	1800
3	Process Engineer	Non-production	expert	3	150	5400
4	Quality Control Technician	Production	Skilled	3	130	4680
5	Production Line Operator	Production	Skilled	30	130	46800
6	Unskilled Worker	Production	Unskilled	50	120	72000
7	Maintenance Technician	Production	Skilled	3	130	4680
8	Laboratory and Quality Control Specialist	Non-production	Skilled	3	130	4680
9	Workplace Safety and Health Specialist	Non-production	Skilled	2	130	3120
10	Procurement and Purchasing Officer	Non-production	Skilled	2	130	3120
11	Accountant	Non-production	Skilled	2	130	3120
12	Warehouse Manager	Non-production	Skilled	1	130	1560
13	Warehouse Staff	Non-production	Skilled	3	130	4680
14	Security	Non-production	Unskilled	4	120	5760
15	Administrative Officer	Non-production	Skilled	2	130	3120
16	Administrative Staff	Non-production	Unskilled	4	120	5760
17	Cleaning and Services	Non-production	Unskilled	3	120	4320
18	Internal Transport Driver	Production	Skilled	3	130	4680
Total				120	-	181080
Benefits, Bonuses, and Employer Insurance (60% of total salary)						108648
Grand Total						289728

No.	Skill level	number	Salaries (wages) (Rials)
1	expert	5	150,000,000
2	skilled	43	130,000,000
3	unskilled	36	120,000,000

- Number of skilled personnel required: **43 persons**
- Number of unskilled personnel required: **36 persons**
- Number of expert personnel required : **5 persons**

4- Ownership and legal permission:

4-1- ownership of land:

The industrial unit is proposed to be established in the Gilan Gharb Industrial Park. The land ownership belongs to the Kermanshah Industrial Parks Company, which, as part of its support for establishing industrial units in underdeveloped regions, offers land to investors by requiring a 10% cash payment, with the remainder payable in long-term installments. Upon obtaining an operating license and completing trial production, the title of the land is transferred to the industrial unit. Establishing production units in industrial parks brings numerous benefits to both the units and the national economy. These advantages include reducing production costs, facilitating market access, improving productivity, enhancing product quality, creating employment opportunities, and promoting sustainable development. Additional advantages of locating in industrial parks include:

1. Infrastructure and Service Benefits:

- **Easy Access to Essential Infrastructure:** Industrial parks are typically equipped with essential networks such as water, electricity, gas, sewage, and telecommunications, significantly reducing the initial investment costs for production units.
- **Availability of Shared Facilities:** Many industrial parks feature shared amenities like wastewater treatment plants, fire stations, technical and engineering service centers, police stations, medical centers, etc., which reduce operational costs for the units.
- **Access to Convenient Transportation:** Most industrial parks are connected to road and rail networks, facilitating the transportation of raw materials and finished products.
- **Availability of Ready-to-Use Land:** In industrial parks, there is land with industrial zoning readily available, allowing production units to acquire the required land with minimal difficulty and time.
- **Research and Technology Centers:** Some industrial parks host research and technology centers that can assist in improving product quality and production processes.

2. Economic and Legal Benefits:

- **Tax Incentives:** Production units located in industrial parks enjoy tax benefits such as exemptions and investment incentives.
- **Simplified Licensing Process:** The process of obtaining the necessary permits to set up an industrial unit in an industrial park is generally simpler and faster than in other areas.
- **Access to Banking Facilities:** Industrial units in industrial parks have easier access to banking facilities and can benefit from credit guarantees provided by guarantee funds.
- **Reduced Administrative Costs:** Locating in industrial parks streamlines the licensing and administrative processes, reducing associated time and costs.
- **Industrial Clustering:** The concentration of similar or related production units in an industrial park enables the creation of industrial clusters, resulting in increased productivity, cost reductions, and improved product quality.

3. Environmental and Social Benefits:

- **Pollution Control:** Due to environmental regulations in industrial parks, pollution control and environmental protection are facilitated.
- **Employment Creation:** The establishment of production units in an industrial park leads to job creation and economic development in the region.
- **Improved Living Standards:** The development of industrial parks and their social responsibility towards surrounding areas can contribute to improved infrastructure and living standards for the local population.

4-2- Intellectual property and incentives:

Intellectual property (IP) rights grant an individual or organization exclusive rights to protect their intellectual and intangible assets, such as inventions, industrial designs, utility models, trademarks, trade names, geographical indications, and copyrights. Registering intellectual property prevents unauthorized copying of ideas, products, and processes, enabling a competitive advantage. Strong IP protection not only enhances brand value and product credibility but can also attract investors. Additionally, income can be generated by licensing IP rights to others. In establishing an industrial unit for activated carbon production, IP protection is critical and can significantly impact the success and growth of the business. Below are some key aspects of intellectual property and IP rights relevant to this field:

- **Patents:** If a new or improved method for producing activated carbon, or a specific machine or equipment for this process, has been developed, a patent application can be filed. Patents grant exclusive rights to use, manufacture, and sell the invention.
- **Industrial Designs:** If the final product (activated carbon) or its packaging has an aesthetically unique design, an industrial design registration can be pursued to prevent design copying.
- **Utility Models:** If any tools or equipment used in activated carbon production have a novel and useful form, a utility model registration can be obtained.
- **Trademarks:** Trade names, logos, and other branding elements used to identify products and services should be registered as trademarks to protect brand identity and prevent unauthorized use.
- **Copyright:** Any written materials, instructions, or other documented content created for the production of activated carbon can be protected under copyright law to safeguard the authors' rights.
- **Technical Know-how:** Technical knowledge and specialized information related to the activated carbon production process represent a highly valuable asset. Non-disclosure agreements and other legal tools can be employed to prevent the unauthorized disclosure of this knowledge.

4-3-legal permission:

To establish and operate an industrial unit for activated carbon production in the Gilan Gharb Industrial Park in Kermanshah, obtaining several legal permits is essential. These permits are issued by various organizations and are necessary to ensure compliance with environmental, safety, technical, and other regulatory standards. The main required permits include:

- **Construction Permit (Establishment License):** This permit is issued by the Kermanshah Province Industry, Mining, and Trade Organization. To obtain this license, submission of a technical and economic feasibility study, company registration documents, and other required paperwork is mandatory.
- **Environmental Permit:** Issued by the Environmental Protection Agency, this permit requires conducting an Environmental Impact Assessment (EIA) for the project and submitting a waste management plan for the industrial unit.
- **Safety and Health Permit:** This permit is granted by the Kermanshah Department of Cooperative, Labor, and Social Welfare. Compliance with occupational safety and health standards within the industrial unit is required for approval.
- **Fire Safety Permit:** Issued by the Fire Department, this permit requires adherence to fire safety standards in the facility's building and equipment.

- **Utility Permits (Electricity, Water, Gas):** These permits are issued respectively by the Provincial Power Distribution Company, Water and Wastewater Company, and Gas Company of Kermanshah. Detailed calculations of electricity, water, and gas consumption, along with compliance with related standards, are required.
- **Construction Permit from Industrial Parks Company:** This permit is issued by the Kermanshah Industrial Parks Company and is necessary for constructing and equipping the industrial unit.
- **Operating License:** Issued by the Ministry of Industry, Mining, and Trade, this license provides the legal authorization to conduct industrial activities.

5- Market study and Competition:

Activated carbon plays a crucial role in various industries as a strategic material. In industrialized countries, activated carbon is widely used in chemical, pharmaceutical, food, and healthcare sectors. In the pharmaceutical industry, it is utilized in the production of medicines and chemical purification. Additionally, in the food industry, it is used for decolorization and purification of food and beverages. In advanced countries, the use of activated carbon has also increased as part of waste management and material recycling strategies, as it can effectively absorb and separate pollutants from industrial and urban waste. Therefore, market analysis and understanding can guarantee and enhance the success of an industrial unit in this growing market. A general analysis of the market and competition in the activated carbon production industry involves assessing various factors, including market trends, competitors, consumer needs, and challenges ahead:

• **Market Trends:**

- **Market Growth:** The global activated carbon market has experienced significant growth in recent years due to increased demand for water purification, air quality improvement, pharmaceuticals, and various industries. This trend is expected to continue due to growing environmental concerns and the need for sustainable resource management. The average compound annual growth rate (CAGR) is forecasted at around 6.9% from 2024 to 2030, with the volume reaching approximately 3.3 million tons and the market value reaching around 9 billion USD by 2030. The table below outlines the market growth trends from 2014 to 2024 and the key growth drivers each year:

Growth Driver	Market Size (Billion USD)	CAGR	Year
Increased demand from tire industries	16.5	-	2014
Growth of the automotive industry	17.2	4.23%	2015
New applications in the construction sector	17.9	4.07%	2016
Demand for composite materials	18.5	3.36%	2017
Technological innovations in activated carbon production	19.2	3.78%	2018
Increased awareness of activated carbon properties	20.0	4.17%	2019
Pandemic impact on demand for sanitary materials	20.5	2.50%	2020
Growth in electronics industry consumption	21.0	2.44%	2021
Expansion of emerging markets	22.0	4.76%	2022
Increased applications in water purification	23.1	5.00%	2023
Rising demand from chemical industries	24.3	5.19%	2024

- **High Demand in Specific Sectors:** Demand has notably increased in sectors such as water and wastewater treatment, pharmaceuticals, food, and air purification. These sectors are particularly dependent on activated carbon due to their specific needs and high standards.
- **Innovation and Technology:** Technological advancements in activated carbon production, such as the use of new raw materials and improvements in manufacturing methods, have led to enhanced quality and reduced costs.
- **Market Competition:**
- **Major Players:** The leading global producers of activated carbon and their market shares are as follows: China (35%), the USA (15%), India (12%), Indonesia (8%), Japan (6%), South Korea (5%), and Germany (4%), with Iran holding less than 1%. Notable global companies in activated carbon production include Cabot Norit, Calgon Carbon, Kureha Corporation, and Desotec. These companies dominate the market through advanced technologies and extensive distribution networks. Key Iranian competitors include:
 - **PARS Activated Carbon (PAC)** with an annual production capacity of around 50,000 tons
 - **Toos Petrochemical** with a production capacity of about 45,000 tons
 - **Activated Carbon Industrial Technologies (ACIT)** with a production capacity of around 40,000 tons
 - **Carbon Industry (IC)** with an annual capacity of 20,000 tons
 - **Parsian Carbon (PC)** with an annual production capacity of approximately 45,000 tons
 - **Simorgh Carbon** with an annual capacity of 42,000 tons.
- **Price Competition:** The price of activated carbon is influenced by production costs, raw material prices, and market demand. Intense competition in the market may lead to lower prices and pressure on manufacturers' profit margins.
- **Product Differentiation:** Large companies strive to differentiate themselves from competitors by offering high-quality products, better customer services, and technological innovations.
- **Consumer Needs:**
- **Main Consumers:** The leading consumers of activated carbon and their respective shares of the global market are: China (30%) for water treatment, food and beverage industries; the USA (20%) for chemical, pharmaceutical, and food industries; India (12%) for food and pharmaceuticals; Japan (10%) for electronics and advanced chemicals; Germany (8%) for its strong chemical and petrochemical industries; South Korea (7%) focusing on electronics and chemicals; and Brazil (6%) due to growth in agricultural and food industries. Iran, with the growth of the oil, gas, and petrochemical sectors, accounts for about 2% of global consumption.
- **Quality and Performance:** Consumers seek high-quality activated carbon that delivers optimal performance in pollutant absorption and purification. Quality and efficiency standards are especially high for industries like water treatment, pharmaceuticals, and food production.
- **Price:** Competitive pricing and overall production and distribution costs are key factors in consumer decision-making. Manufacturers must balance quality and price to succeed in the competitive market.
- **Support and Services:** Providing after-sales support and technical assistance, including consulting and installation services, can strengthen customer relationships and enhance satisfaction.

- **Challenges and Opportunities:**

- **Challenges:**

- **Raw Material Prices:** Fluctuations in raw material prices, such as coal and other base materials, can affect the production costs of activated carbon. According to reports from IMARC and IndexBox, the global average price fluctuated between 2000 and 3000 euros per ton from 2019 to 2023.
- **Environmental Regulations:** Changes in environmental regulations and the need to meet high standards may increase production costs and necessitate investment in new technologies.
- **Intense Competition:** Global competition, especially from large and innovative manufacturers, puts significant pressure on small and medium-sized companies.

- **Opportunities:**

- **Emerging Market Growth:** The growing need for water treatment and air quality improvement in emerging markets like China and India presents new opportunities for the activated carbon market.
- **Technological Innovations:** New technologies in activated carbon production and its applications can improve quality and reduce costs, helping manufacturers increase market share and attract new customers.
- **Increased Environmental Awareness:** Rising environmental concerns and the need for sustainable resource management are driving demand for activated carbon as an effective solution for purification and pollution control.

Therefore, the activated carbon market is growing due to diverse industry needs and technological advancements. Competition in this market is especially fierce among large and innovative producers. Manufacturers must continuously improve product quality, reduce costs, and enhance customer services to succeed in the competitive market. Additionally, focusing on emerging market opportunities and developing new technologies will help sustain growth and development in this industry.

5-1- Introduce target market:

The target market for activated carbon is heavily dependent on the specific usage and needs of each country. Countries with advanced industries tend to have a higher consumption of activated carbon in sectors such as water treatment, pharmaceuticals, and air purification. In contrast, developing countries or those with strong mining, oil, and gas industries make greater use of activated carbon in these sectors. Considering these differences, activated carbon producers should tailor their marketing strategies based on the specific needs of each target market. The global target market for this important and strategic product can be divided into various categories based on usage and key consuming countries, as outlined below. These markets have their own unique characteristics and requirements that influence the demand and consumption of this material:

- **Water and Wastewater Treatment:**

- **Target Market:** Developed and developing countries such as the United States, China, India, Japan, Germany.
- **Usage:** Water and wastewater treatment for removing pollutants, organic materials, chlorine, and unpleasant odors.
- **Market Growth Reason:** Environmental concerns and the need for sustainable water resource management in countries like China and India have driven the growing demand for activated carbon in this sector.

- **Pharmaceuticals and Healthcare:**

- **Target Market:** Countries with advanced pharmaceutical industries such as the United States, Germany, Japan, South Korea, France.

- **Usage:** Manufacturing drugs, purifying pharmaceutical materials, and as a toxin-absorbing agent in medicine.
- **Market Growth Reason:** With the growth of the pharmaceutical industry and increasing demand for medical products, this market continues to expand in developed countries.
- **Food and Beverage Industries:**
 - **Target Market:** Countries with large food and beverage industries such as the United States, China, Brazil, Germany, Japan.
 - **Usage:** Purifying and improving the quality of food and beverages such as sugar, honey, alcoholic and non-alcoholic drinks.
 - **Market Growth Reason:** Increased quality and health standards in food products have boosted demand for activated carbon.
- **Odor Control and Air Purification:**
 - **Target Market:** Industrial and urbanized countries with high populations such as the United States, China, India, Japan, Germany.
 - **Usage:** Used in air purification, odor control in various industries, respirator masks, and air filters.
 - **Market Growth Reason:** The need to improve air quality in urban and industrial areas, particularly in high-pollution countries like China and India, has fueled demand in this market.
- **Automotive Industries:**
 - **Target Market:** Countries with large automotive production, including Japan, the United States, Germany, South Korea, China.
 - **Usage:** Used in car air filters to absorb pollutants and improve in-car air quality.
 - **Market Growth Reason:** With the growth of hybrid and electric vehicle production and the need to control pollutants, the consumption of activated carbon in this sector has increased.
- **Oil, Gas, and Petrochemical Industries:**
 - **Target Market:** Countries with large oil and gas industries such as the United States, Saudi Arabia, China, Russia.
 - **Usage:** Gas and liquid separation and purification in refineries and petrochemical units.
 - **Market Growth Reason:** Demand for activated carbon in this sector is increasing due to the need for pollution reduction and improving the quality of final products.
- **Precious Metal and Gold Extraction:**
 - **Target Market:** Countries with gold and other precious metal mining such as South Africa, Australia, Canada, the United States, Russia.
 - **Usage:** Absorption and recovery of gold from cyanide solutions in extraction processes.
 - **Market Growth Reason:** This sector's target market is expanding due to the high value of precious metals and the growing demand for them.

The table below shows the market share, total value, and average annual growth (CAGR) of activated carbon in different industries from 2014 to 2024. This table is based on available data from market analysis sources, including reports from market analysis firms such as IMARC and IndexBox:

Sector	Market Share (%)	Total Value (Billion USD)	CAGR (%)
Water and Wastewater Treatment	35%–40%	3.0–4.0	6%–8%
Pharmaceuticals and Healthcare	8%–10%	0.7–1.0	5%–7%
Food and Beverage Industries	10%–12%	1.0–1.2	4%–6%
Odor Control and Air Purification	15%–18%	1.5–2.0	7%–9%
Automotive Industries	4%–6%	0.4–0.6	4%–6%
Oil, Gas, and Petrochemical	10%–12%	1.0–1.5	5%–7%
Precious Metal and Gold Extraction	5%–7%	0.5–0.7	3%–5%

Based on the above, the most logical and expert decision for the target market of this project, which aims to be actively involved in export market development, is to focus on the subsectors and countries where these industries have a significant share of the global market. Of course, given the importance of the oil, gas, and petrochemical industries in the domestic market, focusing on this sector could also be economically and justifiably supportive of establishing such an industrial unit.

6- Physical Progress of project: yes ☐ No ☒

This project has been proposed as one of the priority investment projects of the province by the Investment and Economic and Technical Assistance Organization of Iran, the Kermanshah Governor's Office, the Economic and Finance Affairs Organization, and the General Department of Industry, Mine, and Trade of the province to the private and non-governmental sector. It is currently in the phase of preparing a technical-economic feasibility study.

7- Action plan and Implementation schedule:

Project Implementation Timeline

Phase	Activity Description	Duration	Notes
Market Analysis and Planning	<ul style="list-style-type: none"> - Market analysis and industry needs assessment - Competitor analysis and opportunity identification - Preparation of the economic justification plan 	1 month	Includes data collection, opportunity evaluation, and drafting of the business plan.
Financial Planning and Investment Attraction	<ul style="list-style-type: none"> - Preparation of financial plan - Attracting investors - Securing loans and necessary credit 	1 month	Requires preparation of financial documentation and negotiations with banks and investors.
Site Selection and Licensing	<ul style="list-style-type: none"> - Selection of appropriate location for the production unit - Obtaining necessary permits from legal authorities 	1 month	Includes land review, construction and operating permits, and environmental impact assessment.
Design and Engineering	<ul style="list-style-type: none"> - Designing architectural plans and layouts - Equipment and machinery selection - Engineering consultation 	1 month	Detailed design of the production unit, equipment selection, and planning for installation and startup.
Construction and Setup	<ul style="list-style-type: none"> - Construction and preparation of building - Installation of equipment and machinery - Initial testing and trials 	6 month	Involves physical construction, equipment installation, and initial tests to verify equipment performance.
Staffing and Training	<ul style="list-style-type: none"> - Recruitment of required staff - Providing necessary training - Preparing the operational team 	1 month	The process of hiring and training personnel to perform various tasks in the production unit.
Final Testing and Trials	<ul style="list-style-type: none"> - Conducting final tests and evaluating production performance - Troubleshooting and process optimization 	1 month	Comprehensive testing of equipment and processes to ensure proper performance and optimization.
Commissioning and Production Start	<ul style="list-style-type: none"> - Initiating trial production - Reviewing and adjusting production processes - Commencing official production 	2 month	Starting trial production to ensure proper functioning and then launching official production.
Marketing and Distribution	<ul style="list-style-type: none"> - Developing marketing strategies - Introducing the product to the market - Establishing distribution network 	1 month	Includes marketing, sales, and establishing distribution channels for the produced products.
Monitoring and Continuous Improvement	<ul style="list-style-type: none"> - Monitoring production performance - Collecting feedback and improving processes - Updating equipment and methods 	Ongoing	Continuous evaluation of production performance, gathering customer feedback, and ongoing improvement of processes and equipment.

According to the above schedule, the project implementation will take **15 months**.

8- Financial projection:

8-1- The cost estimate:

The cost estimate

No.	subject	costs (million Rials)
1	Fixed investments	24,917,970
2	Operating costs	85,084,908
3	Financial costs	-

Fixed investment

No.	subject		costs (million Rials)
1	land purchase		800,000
2	Site preparation and development		871,000
3	Civil works, structures and buildings		3,645,000
4	Plant machinery and equipment		15,280,000
5	Auxiliary and service plant equipment		20,000
6	Environmental protection		20,000
7	Incorporated fixed assets (project overheads)		2,063,600
8	Pre-production expenditures (net of interest)	Studies	412,720
		Management and organization	412,720
		license	206,360
9	contingencies costs		1,186,570
Total Fix investment			24,917,970

Operating cost

Row	Item	Distribution Ratio	Cost (Million Rials)
	Current Expenses		47,407,237
1	Raw Materials*	100%	40,000,000
2	Workforce*	30%	70,531
3	Marketing (excluding workforce)	100%	1,000,000
4	Depreciation		
5	Other Current Expenses		
	- Energy*	85%	4,420
	- Maintenance*	20%	169,280
	- Unforeseen (2.5% of items*)	20%	6,163,006
	Fixed Expenses		37,677,671
6	Raw Materials*		
7	Workforce*	70%	164,573
8	Marketing (excluding workforce)		
9	Depreciation	100%	1,911,500
10	Other Fixed Expenses		
	- Energy*	15%	780
	- Maintenance*	80%	677,120
	- Unforeseen (2.5% of items*)	80%	34,923,698
	Total (Million Rials)		

Notes:

- Marketing expenses are calculated as 2% of the total annual revenue at nominal capacity.
- Depreciation rates considered: 10% for machinery and equipment, 10% for buildings, 20% for vehicles, and 20% for office equipment.
- Maintenance rates considered: 5% for machinery and equipment, 2% for buildings, 10% for vehicles, and 10% for office equipment

8-2- Estimated revenues:

To minimize the project's risk, the minimum price per ton (€2,000) was used to estimate revenue. Based on this, the projected revenue in billion Rials starts at 60,000 in the first year and gradually increases to 100,000 by the fifth year as capacity utilization ramps up from 60% to 100%.

Related Topic	Season 1	Season 2	Season 3	Season 4	Year 1 Total	Year 2	Year 3	Year 4	Year 5
Capacity Realization (%)	15%	15%	15%	15%	60%	70%	80%	90%	100%
Actual Capacity (tons)	15,000	15,000	15,000	15,000	60,000	70,000	80,000	90,000	100,000
Price per Ton (€)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Revenue (thousand €)	30,000	30,000	30,000	30,000	120,000	140,000	160,000	180,000	200,000
Revenue (billion Rials)	15,000	15,000	15,000	15,000	60,000	70,000	80,000	90,000	100,000

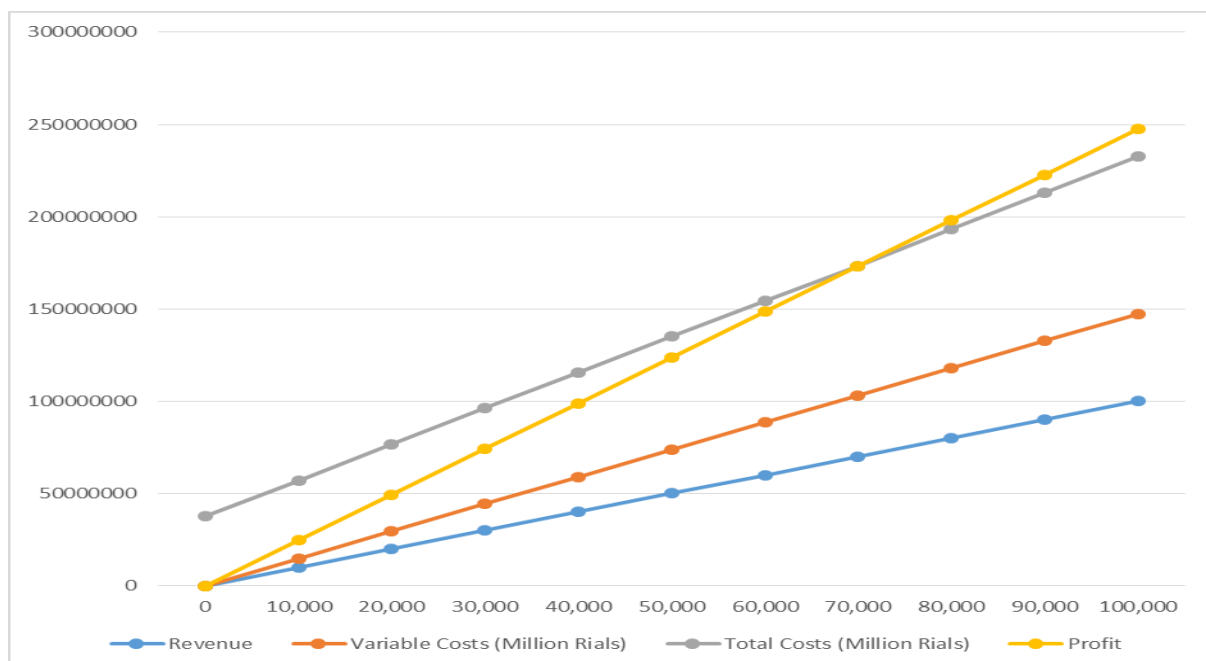
8-3-Duration of project operation:

Considering the multiple factors influencing the economic lifespan of industrial projects, such as the production of activated carbon, including raw material reserves, localized technology, market fluctuations, and government support policies, the optimal operating period for this project is estimated to be 10 years, with a discount rate of 18%. This timeframe has been determined by taking into account the desired rate of return for investors, the projected maintenance and repair costs, and a sensitivity analysis with respect to variations in key parameters.

8-4-Break- even analysis:

The break-even analysis for the activated carbon production project indicates that with an annual production and sale of approximately 70,020 tons of activated carbon—equivalent to 70.02% of the project's nominal capacity—the project will reach its break-even point. This point has been calculated by taking into account fixed costs, including initial investment, general expenses, fixed production costs, and variable production costs per ton of activated carbon. Given the factory's production capacity and market forecasts, the project is expected to quickly reach the break-even point and enter a phase of sustainable profitability. The break-even analysis is shown in the table below:

Tons Produced	Revenue (Million Rials)	Variable Costs (Million Rials)	Total Costs (Million Rials)	Profit (Million Rials)
0	0	0	37,677,671	-37,677,671
10,000	10,000,000	4,740,700	42,418,371	-32,418,371
20,000	20,000,000	9,481,400	47,159,071	-27,159,071
30,000	30,000,000	14,222,100	51,899,771	-21,899,771
40,000	40,000,000	18,962,800	56,640,471	-16,640,471
50,000	50,000,000	23,703,500	61,381,171	-11,381,171
60,000	60,000,000	28,444,200	66,121,871	-6,121,871
70,000	70,000,000	33,184,900	70,000,000	0
80,000	80,000,000	37,925,600	75,603,271	4,396,729
90,000	90,000,000	42,666,300	80,344,071	9,655,929
100,000	100,000,000	47,407,000	85,084,771	14,915,229



8-5- Cost-benefit analysis:

The table of project efficiency indicators

total fixed investment Present value	393,706,305 million Rials
total net revenue Present value	586,622,395 million Rials
Net present value (NPV)	192,916,090 million Rials
benefit - Cost ratio B/C	1.49
Internal rate of return (IIR)	70.42%

Analysis of Indicators:

1. Net Present Value (NPV):

- The NPV is positive and equals 192,916,090 million Rials, indicating that the project is financially profitable. The higher the NPV, the more attractive the project is from a financial perspective.

2. Benefit-to-Cost Ratio (B/C):

- The B/C ratio is 1.49, meaning that for every unit of cost, the project generates 1.49 units of revenue. A ratio above 1 indicates that the project is economically viable and that investing in it is logical.

3. Internal Rate of Return (IRR):

- The IRR is 70.42%, which is a very high rate of return, indicating that the project is highly profitable. The higher the IRR compared to the interest rate, the more attractive the project will be.

4. Payback Period:

- The payback period is 2 year and 8 months, which is relatively short and indicates that the investment in this project will be recouped in a short amount of time.

Conclusion:

Based on the provided indicators, the activated carbon production project appears to be financially attractive and profitable due to:

1. Positive and high NPV, indicating the profitability of the project.
2. A B/C ratio greater than 1, suggesting the project is economically viable.
3. A very high IRR, reflecting a high return on investment.
4. A short payback period, indicating reduced investment risk.

Overall, considering the analysis of the indicators, it is recommended to proceed with the project, as it is expected to yield high returns and reach profitability in a short period of time.

8-6- Sensitivity analysis of IRR:

A- Sensitivity Analysis of the Project Based on Annual Revenue

The table below presents the sensitivity analysis of the industrial unit producing activated carbon based on annual revenue. This analysis examines the impact of revenue changes on the economic indicators of the project, including NPV (Net Present Value), IRR (Internal Rate of Return), and payback period. The percentage changes in revenue range from -30% to +30%, as detailed in the table:

Percentage Change	New Revenue (Million IRR)	NPV (Million IRR)	IRR (%)	Payback Period (Years)
-30%	410,635,676	127,793,126	47.85	3.34
-20%	469,298,916	161,691,533	55.56	3.05
-10%	527,962,156	195,589,939	61.35	2.88
0%	586,622,395	192,916,090	70.42	2.67
+10%	645,286,635	228,813,497	81.3	2.48
+20%	703,950,875	264,710,904	93.46	2.32
+30%	762,615,115	300,608,311	107.53	2.18

Comprehensive Analysis:

- **Impact of Decreasing Revenue on Economic Indicators:**
 - **30% Decrease in Revenue:** The new revenue decreases to 410,635,676 million IRR. The NPV drops to 127,793,126 million IRR, indicating reduced profitability. The IRR decreases to 47.85%, and the payback period increases to 3.34 years. This shows that a reduction in revenue negatively affects the profitability and return of the project, requiring more time for investment recovery.
 - **20% Decrease in Revenue:** The new revenue reaches 469,298,916 million IRR. The NPV decreases to 161,691,533 million IRR, and the IRR drops to 55.56%. The payback period increases to 3.05 years. These changes also demonstrate that reduced revenue negatively impacts profitability and return.
 - **10% Decrease in Revenue:** The new revenue decreases to 527,962,156 million IRR. The NPV drops to 195,589,939 million IRR, and the IRR falls to 61.35%. The payback period increases to 2.88 years. These changes indicate a relative decline in profitability and return but still show reasonable project profitability.
- **Impact of Increasing Revenue on Economic Indicators:**
 - **10% Increase in Revenue:** The new revenue rises to 645,286,635 million IRR. The NPV increases to 228,813,497 million IRR, and the IRR rises to 81.30%. The payback period reduces to 2.48 years. This indicates that increased revenue has a positive effect on profitability and return, reducing the time needed for investment recovery.
 - **20% Increase in Revenue:** The new revenue reaches 703,950,875 million IRR. The NPV increases to 264,710,904 million IRR, and the IRR rises to 93.46%. The payback period decreases to 2.32 years. These changes suggest a significant increase in profitability and return.
 - **30% Increase in Revenue:** The new revenue rises to 762,615,115 million IRR. The NPV increases to 300,608,311 million IRR, and the IRR increases to 107.53%. The payback period decreases to 2.18 years. These changes show a substantial increase in profitability and return.

Conclusion:

- **Project Stability and Flexibility:** The activated carbon production project shows that revenue changes can significantly impact its economic indicators. A 10% decrease in revenue still results in positive NPV and IRR, but a further decrease (such as 30%) can bring about more challenges. Conversely, increasing revenue, particularly by 20% or 30%, leads to a sharp increase in NPV and IRR, reducing the payback period.
- **Risk Management:** Based on the sensitivity analysis, project managers can devise strategies to manage risks and capitalize on opportunities for revenue growth. Accurate financial and managerial planning to counteract revenue reductions and leverage revenue increases will improve the overall performance of the project.

The activated carbon production project is highly sensitive to revenue fluctuations. The sensitivity analysis indicates that the project has high profitability and return with increased revenue, and the payback period shortens. On the other hand, a decrease in revenue reduces profitability and return and increases the payback period. This analysis helps decision-makers formulate appropriate strategies for managing the project and take necessary actions in the face of potential changes.

B- Sensitivity Analysis of the Project Based on Annual Production Costs

The table below presents the sensitivity analysis of the industrial unit for the production of activated carbon based on production costs. This analysis examines the impact of changes in revenue on the economic indicators of the project, including NPV (Net Present Value), IRR (Internal Rate of Return), and payback period. Percentage changes in production costs range from -30% to +30%, as detailed in the table.

Percentage Change	New Cost (Million Rial)	NPV (Million Rial)	IRR (%)	Payback Period (Years)
-30%	275,594,414	311,028,981	87.72	2.39
-20%	314,964,984	271,657,411	69.93	2.68
-10%	353,335,554	232,286,841	57.8	2.98
0%	393,706,305	192,916,090	70.42	2.67
+10%	433,076,875	153,545,520	54.95	3.07
+20%	472,447,445	114,174,950	45.05	3.47
+30%	511,818,015	74,804,380	38.31	3.86

Comprehensive Analysis:

- **Impact of Decreasing Annual Production Costs on Economic Indicators:**
 - **30% Reduction in Costs:** In this case, the new cost decreases to 275,594,414 million IRR. The NPV increases to 311,028,981 million IRR, reflecting a significant increase in the project's profitability. The IRR rises to 87.72%, and the payback period decreases to 2.39 years. This indicates that a reduction in production costs has a substantial positive effect on profitability and project returns, and a shorter time is required for investment recovery.
 - **20% Reduction in Costs:** The new cost becomes 314,964,984 million IRR. The NPV decreases to 271,657,411 million IRR, and the IRR decreases to 69.93%. The payback period increases to 2.68 years. These changes show that cost reductions still have a significant positive impact on profitability and project returns.
 - **10% Reduction in Costs:** The new cost decreases to 353,335,554 million IRR. The NPV decreases to 232,286,841 million IRR, and the IRR decreases to 57.80%. The payback period increases to 2.98 years. These changes indicate an increase in profitability and returns with a relative decrease in costs.

- **Impact of Increasing Annual Production Costs on Economic Indicators:**
 - **10% Increase in Costs:** The new cost rises to 433,076,875 million IRR. The NPV decreases to 153,545,520 million IRR, and the IRR drops to 54.95%. The payback period increases to 3.07 years. This indicates that increasing production costs has a negative impact on profitability and project returns, requiring a longer time for investment recovery.
 - **20% Increase in Costs:** The new cost becomes 472,447,445 million IRR. The NPV decreases to 114,174,950 million IRR, and the IRR drops to 45.05%. The payback period increases to 3.47 years. These changes reflect a decline in profitability and project returns as costs increase.
 - **30% Increase in Costs:** The new cost rises to 511,818,015 million IRR. The NPV decreases to 74,804,380 million IRR, and the IRR drops to 38.31%. The payback period increases to 3.86 years. These changes demonstrate a significant reduction in profitability and project returns.

Conclusion:

- **Project Stability and Flexibility:** The activated carbon production project demonstrates that changes in production costs can significantly affect its economic indicators. A decrease in costs leads to a sharp increase in NPV and IRR and a significant reduction in the payback period. On the other hand, an increase in costs results in reduced profitability and returns, along with a longer payback period.
- **Risk Management:** Based on the sensitivity analysis, project managers can develop strategies to manage risks and capitalize on opportunities to reduce costs. Accurate financial and managerial planning to control production costs can improve the overall performance of the project.

The activated carbon production project is sensitive to changes in annual production costs. The sensitivity analysis shows that cost reductions increase profitability and returns and reduce the payback period, while cost increases have a negative impact on economic indicators. This analysis helps decision-makers develop appropriate strategies for project management and take necessary actions in response to potential changes.

C- Project Sensitivity Analysis Based on Fixed Investment Costs

The table below shows the sensitivity analysis of the activated carbon production unit project based on production costs. This analysis examines the impact of changes in revenue on the project's economic indicators, including NPV (Net Present Value), IRR (Internal Rate of Return), and payback period. The percentage changes in production costs range from -30% to +30%, as detailed in the table:

Percentage Change	New Cost (Million Rial)	NPV (Million Rial)	IRR (%)	Payback Period (Years)
-30%	17,442,539	412,025,856	128.21	2.03
-20%	19,934,376	387,107,519	114.94	2.12
-10%	22,426,212	362,189,183	103.09	2.22
0%	24,917,970	192,916,090	70.42	2.67
+10%	27,409,707	168,998,756	65.79	2.77
+20%	29,899,644	145,081,421	61.35	2.88
+30%	32,391,481	121,164,086	57.14	3.00

Comprehensive Analysis:

Impact of Reducing Investment Costs on Economic Indicators:

- **30% Reduction in Costs:** In this case, the new cost reduces to 17,442,539 million Rial. The NPV increases to 412,025,856 million Rial, indicating a significant increase in the project's profitability. The IRR rises to 128.21%, and the payback period decreases to 2.03 years. This shows that reducing investment costs has a highly

positive impact on the project's profitability and returns, with a quicker payback period.

- **20% Reduction in Costs:** The new cost becomes 19,934,376 million Rial. NPV reaches 387,107,519 million Rial, and IRR decreases to 114.94%. The payback period increases to 2.12 years. These changes indicate that reducing investment costs still has a significant positive impact on the project's profitability and returns.
- **10% Reduction in Costs:** The new cost becomes 22,426,212 million Rial. NPV decreases to 362,189,183 million Rial, and IRR decreases to 103.09%. The payback period increases to 2.22 years. These changes show that profitability and returns increase with a relative decrease in costs.

Impact of Increasing Investment Costs on Economic Indicators:

- **10% Increase in Costs:** The new cost increases to 27,409,707 million Rial. NPV decreases to 168,998,756 million Rial, and IRR drops to 65.79%. The payback period increases to 2.77 years. This indicates that increasing investment costs negatively impacts profitability and returns, requiring more time for capital recovery.
- **20% Increase in Costs:** The new cost becomes 29,899,644 million Rial. NPV decreases to 145,081,421 million Rial, and IRR decreases to 61.35%. The payback period increases to 2.88 years. These changes show that increasing investment costs reduces profitability and returns.
- **30% Increase in Costs:** The new cost reaches 32,391,481 million Rial. NPV decreases to 121,164,086 million Rial, and IRR drops to 57.14%. The payback period increases to 3.00 years. These changes show a significant reduction in profitability and returns.

Conclusion:

- **Project Stability and Flexibility:** The activated carbon production project demonstrates that changes in investment costs can significantly impact its economic indicators. A reduction in costs leads to a sharp increase in NPV and IRR, while the payback period is substantially reduced. On the other hand, increasing costs reduces profitability and returns, while increasing the payback period.
- **Risk Management:** Based on the sensitivity analysis, project managers can develop appropriate strategies to manage risks and capitalize on opportunities to reduce costs. Accurate financial and managerial planning to control investment costs can help improve the overall performance of the project.

The activated carbon production project is sensitive to changes in investment costs. The sensitivity analysis shows that reducing costs enhances profitability and returns while shortening the payback period, whereas increasing costs negatively affects the economic indicators. This analysis helps decision-makers formulate appropriate strategies for project management and take necessary actions in response to potential changes.

8-7- Summarize table:

"Summary of economic issues"

activity	International Standard Industrial Classification (ISIC Code)	product name	Nominal capacity (unit)
Production	24291510	Activated Carbon	100,000 tons
Activity duration	Fix investment (million Rials)	Variable investment (million Rials)	Human resources
15 months	24,917,970	85,084,908	120 people
Internal rate of return (IRR)	Net present value (million Rials)	Owners share (million Rials)	Benefit-cost ratio *B/C
70.42%	192,916,090	22,000,575	1.49

Economic and Strategic Analysis

- **Internal Rate of Return (IRR):** The 70.42% IRR indicates the high profitability of the project. This return is significantly higher than bank interest rates and annual inflation, representing a rapid return on investment and good profitability in both the short and long term.
- **Net Present Value (NPV):** The NPV of 192,916,090 million rials clearly shows that the project will not only cover all initial investment costs but also yield substantial profits for investors. This figure demonstrates the project's profitability and investment attractiveness.
- **Benefit-Cost Ratio (B/C):** The B/C ratio of 1.49 indicates that for every unit of cost, 1.49 units of profit will be generated. This economic indicator confirms that investing in this project is highly reasonable and profitable, promising a good return on investment.
- **Payback Period:** The short payback period of 2 year and 8 months means that investors can recover their investment in a very short time and, after that, only focus on profitability. This feature reduces investment risk and increases investor confidence.
- **Annual Working Capital and Workforce:** The need for 85,084,908 million rials in annual working capital and the employment of 120 people demonstrate the high potential for job creation and positive impact on the local economy. This aspect could also lead to government and social support.

Market Opportunities: Activated carbon is a vital material in water and air purification processes, the food and pharmaceutical industries, as well as in the oil and gas industry, and has high demand. With increasing environmental concerns and the need to improve quality of life, the demand for activated carbon is steadily rising. This growing demand ensures a sustainable market for the product.

Competitive Analysis: This project, leveraging advanced technologies and optimized production processes, can produce a high-quality product at competitive prices. Furthermore, utilizing local resources and reducing transportation costs provides a significant competitive advantage.

Conclusion: The activated carbon production project, with strong economic indicators and favorable market opportunities, is a highly attractive and profitable investment opportunity. The high internal rate of return, positive net present value, and short payback period all indicate that investing in this project not only involves lower risk but also offers high returns. Investors can confidently enter this project and benefit from its long-term profitability.

This project will not only lead to a quick return on investment and substantial profitability but also contribute to job creation and regional economic development.

8-8-Estimation of exchange rate changes during the project implementation:

To analyze the impact of exchange rate fluctuations on the project of establishing an industrial active carbon production unit, various scenarios can be used to address key aspects of the project, including costs, financing, and managing exchange rate risks. These scenarios help minimize the negative effects of exchange rate fluctuations (whether the dollar or euro) and achieve optimal profitability. Below is an analysis of these aspects:

Cost Analysis Considering Exchange Rate Fluctuations

- **Import Costs:** With the increase in the exchange rate from 30,000 tomans in 2019 to 60,000 tomans in 2024, the import costs of raw materials (excluding coal tar) such as phosphoric acid, zinc chloride, potassium hydroxide, nitrogen gas, refractory bricks, washers and gaskets, industrial filters, insulation materials, and catalysts, as well as most equipment due to high technology that is not available domestically, will rise sharply. This could lead to a significant increase in both fixed and variable costs of the project.
- **Operating Costs:** With the increase in the exchange rate, operating costs such as wages, maintenance, and energy will also be affected, leading to an increase in costs.

Financing and Loan Repayment

- **Foreign Loans:** If financing is secured through foreign loans, the rise in the exchange rate can lead to higher loan repayment costs. This necessitates careful planning for loan repayment based on different exchange rate forecasts.
- **Financial Plans:** Proper selection of financing sources and the use of appropriate financial instruments, such as hedging or forward currency contracts, can help reduce financial risks.

Managing Exchange Rate Risks

- **Use of Financial Instruments:** To reduce the adverse effects of exchange rate fluctuations, financial tools such as forward contracts, currency options, and swaps can be utilized.
- **Financial Planning:** Financial planning based on different exchange rate scenarios and their impact on project costs and revenues can help in managing exchange rate risks and achieving appropriate profitability.

Proposed Scenarios

- **Conservative Scenario:** Assume the exchange rate increases to 80,000 tomans between 2024 and 2026. In this scenario, consider the sharp increase in the import costs of some raw materials and most equipment, as well as the rise in foreign loan repayment costs.
- **Optimistic Scenario:** Assume the exchange rate remains stable at 60,000 tomans between 2024 and 2026. In this scenario, import costs and loan repayment costs will remain controlled, and project profitability is predicted to be better.
- **Realistic Scenario:** Assume the exchange rate reaches 70,000 tomans between 2024 and 2026. In this scenario, a balance must be struck between the increase in costs and their impact on loan repayment, with risk management strategies being employed.

Sensitivity Analysis of Exchange Rate Fluctuations The sensitivity analysis below can assist in evaluating the impact of exchange rate fluctuations on overall costs and project profitability. By examining different scenarios and predicting their impacts, the best strategy for financial management and exchange rate risk management can be chosen:

- **Import Costs:**
 - **Conservative Scenario (Exchange rate 80,000 tomans):**

- Increase in import costs: The import costs of some raw materials and most equipment will increase by 1.33 times (compared to the 60,000 tomans rate).
 - Impact on total cost: If 50% of total project costs are related to imports, the increase in the exchange rate to 80,000 tomans will lead to a 33% rise in import costs.
- **Optimistic Scenario (Exchange rate 60,000 tomans):**
 - Stable import costs: Import costs will remain unchanged at the current exchange rate.
- **Realistic Scenario (Exchange rate 70,000 tomans):**
 - Increase in import costs: Import costs will increase by 1.17 times.
 - Impact on total cost: A 17% increase in import costs.
- **Operating Costs:**
 - **Conservative Scenario:**
 - Increase in operating costs: With the exchange rate rising to 80,000 tomans, operating costs could increase by 1.33 times if operating costs are directly affected by the exchange rate.
 - **Optimistic Scenario:**
 - Stable operating costs: Operating costs will remain unchanged.
 - **Realistic Scenario:**
 - Increase in operating costs: Operating costs will rise by 1.17 times.
- **Loan Repayment:**
 - **Conservative Scenario:**
 - Increase in loan repayment costs: A higher exchange rate will lead to a 1.33 times increase in foreign loan repayment costs, which could put significant financial pressure on the project.
 - **Optimistic Scenario:**
 - Stable repayment costs: Loan repayment costs will remain fixed.
 - **Realistic Scenario:**
 - Increase in loan repayment costs: An increase in the exchange rate by 1.17 times will lead to higher repayment costs.
- **Financing and Financial Plans:**
 - **Conservative Scenario:**
 - Increased financing needs: A rise in the exchange rate may result in additional financing requirements, leading to higher debt and pressure on financial plans.
 - **Optimistic Scenario:**
 - Adequate financing: With a stable exchange rate, financing costs remain at an appropriate level.
 - **Realistic Scenario:**
 - Adequate financing with moderate changes: The need for financing may increase moderately.
- **Currency Financial Instruments:**
 - **Conservative Scenario:**
 - Use of currency hedging: To mitigate the impacts of a high exchange rate, it is recommended to use hedging instruments like forward contracts and swaps.
 - **Optimistic Scenario:**
 - Minimal hedging: With a stable exchange rate, the need for hedging instruments decreases.
 - **Realistic Scenario:**

- Balanced hedging: Using hedging tools moderately will be effective in managing exchange rate risks.
- **Currency Financial Planning:**
 - **Conservative Scenario:**
 - Detailed financial planning: There is a need for precise financial planning to manage the impacts of a high exchange rate and adjust financial strategies and loan repayments.
 - **Optimistic Scenario:**
 - Standard financial planning: Financial planning is conducted under stable exchange rate conditions, with minimal changes required.
 - **Realistic Scenario:**
 - Financial planning with moderate changes: Financial planning should account for medium-level exchange rate changes and employ risk management strategies.

9- Capital needs, the supply and **guarantees** method:

9-1- Foreign currency needed:

Due to the fact that raw materials (except for bituminous coal), such as phosphoric acid, zinc chloride, potassium hydroxide, nitrogen gas, refractory bricks, washers and gaskets, industrial filters, insulation materials, catalysts, and most equipment are not available domestically due to the high technology required, they must be supplied through imports. Additionally, in order for the investor to have the opportunity to secure financial resources to procure them, particularly the equipment and machinery, the foreign currency equivalent of the production equipment and machinery, which amounts to approximately 30,560 thousand euros (15,280 billion rials), has been declared as a need for the two years during which the project is expected to be executed, as follows:

No.	year	The required amount of foreign currency (thousand euros)
1	first	15,280
2	second	15,280
3	third	

9-2- The Way of participation and finance method:

Given the inherent risks in any industrial project, particularly in the field of activated carbon production, which requires significant initial investment, selecting the appropriate financing method is of high importance. The best method depends on various factors such as the amount of capital needed, the project's development stage, the investors' risk tolerance, and market conditions. Below are some of the best methods and key considerations for this project:

- **Financing through banks and financial institutions:**
 - **Bank loans:** By presenting a strong business plan and suitable guarantees, one can benefit from bank loans with specified interest rates.
 - **Credit lines:** A credit line from banks can be used to provide working capital and purchase raw materials.
 - **Letters of credit (LC) and foreign currency credit:** For importing equipment and raw materials, opening a letter of credit can be useful.
- **Attracting investor participation:**

- **Venture capital investors:** These investors are interested in innovative, high-risk projects and can participate in the early stages of the project.
- **Angel investors:** Typically, experienced and wealthy individuals willing to invest in small to medium-sized businesses.
- **Institutional investors:** Large companies and organizations such as social security holding companies, Barakat Foundation, IMIDRO, etc., may invest in activated carbon production projects due to strategic or social benefits.
- **Utilizing government facilities:**
 - **Subsidies and grants:** The government may allocate subsidies to support small and medium-sized industries.
 - **National Development Fund facilities:** This fund offers financial support for large industrial and infrastructure projects.
 - **Guarantee fund facilities:** These funds provide guarantees to help investors access bank loans.

The best approach to financing an activated carbon production project is a combined approach that includes private sector participation, attracting investors, using bank loans, credit lines, and opening letters of credit for foreign currency resources, as well as utilizing government facilities for less-developed regions. This approach not only provides the necessary capital but also helps reduce the financial risks associated with the project.

9-3- Payback period:

Based on the conducted studies and predictions, the payback period for this project is estimated to be around 2 year and 8 months. This estimate takes into account several factors, including the initial investment, operational costs, projected revenues, discount rate, and inflation rate. Additionally, sensitivity analysis regarding changes in key parameters indicates that the project exhibits acceptable resistance to market fluctuations and changes in production costs.

10- Incentives, features and advantages of project:

Establishing an activated carbon production unit in the Gilan-Gharb industrial park of Kermanshah province, considering the existing potentials in the region and the growing demand for this product, can provide numerous opportunities for the economic and industrial development of the area. Below, the incentives, features, and advantages of this project are discussed:

Incentives:

- **Government Support:**
 - Tax and customs exemptions for importing necessary equipment and raw materials.
 - Support for the production and export of high-value-added products.
 - Support for research and development in the production of higher-quality activated carbon.
 - Calculation of foreign machinery with a 90% coefficient in the banking system when implementing the project in deprived areas, and granting loans.
 - Ten years of tax exemption for less developed and deprived regions.
 - Only 10% of the land value is required, with long-term installments in industrial parks of less developed and deprived regions.

Regional Potentials:

- Abundant natural resources such as hardwood (oak), coal, and agricultural waste that can be used as raw materials for activated carbon production.
- Proximity to the Iraqi border and other regional countries can create excellent export opportunities to both domestic and international markets.

- Availability of suitable infrastructure such as water, electricity, gas, roads, and transportation facilities for establishing production units.
- Availability of skilled and inexpensive labor in the region.

Market Demand:

- Growing demand for activated carbon in various industries such as water and wastewater treatment, oil and gas, petrochemicals, pharmaceuticals, and the food industry.
- Lack of high-capacity activated carbon production units in the region.

Project Features:

- **Use of Modern Technologies:**
 - Employing innovative methods for activated carbon production to enhance quality and reduce production costs.
 - Optimizing energy consumption and reducing environmental pollution.
- **Production of Different Types of Activated Carbon:**
 - Production of activated carbon with various characteristics for diverse applications.
 - Tailoring products to meet the needs of both domestic and foreign markets.
- **Job Creation:**
 - Creation of direct and indirect employment for a significant number of people in the region.
- **Value Chain Development:**
 - Expanding the value chain of activated carbon production through the creation of raw material processing units and the production of by-products.

Advantages of the Project:

- **Economic Development of the Region:**
 - Increase in the region's gross domestic product.
 - Creation of high added value from inexpensive local raw materials.
 - Development of related industries and creation of sustainable employment.
 - Expansion of related products such as the production of air and water filters, respiratory masks, and other dependent products.
 - Attraction and encouragement of other investors to invest in the region and boost the local economy.
- **Reduction of Import Dependency:**
 - Reduction in the import of activated carbon and saving foreign currency.
 - Increased self-sufficiency in producing this product.
- **Environmental Protection:**
 - Use of agricultural and industrial waste materials as raw materials.
 - Reduction of environmental pollution caused by waste disposal and improvement of quality of life.
- **Enhancing Technical Knowledge:**
 - Transfer of technical knowledge and technology to the region.
 - Enhancement of the scientific and technical skills of the workforce.

The establishment of this activated carbon production unit in the region can be seen as a golden opportunity for economic and industrial development. Given the government incentives, regional potentials, market demand, and numerous advantages, investment in this sector can lead to high value-added production, job creation, and sustainable development in the region.